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Human subjects participated in this study after giving their free and informed consent. This research has been conducted in compliance with all applicable Federal Regulations governing the Protection of Human Subjects in Research.

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## Abstract

Little is known about the comparative effectiveness of HIV prevention interventions that differ in duration but contain similar content. The objective of this study was to evaluate and compare the effectiveness of two versions (6 hr vs. 3 hr) of a behavioral intervention called the STD/HIV Intervention Program (SHIP) in a sample of Marines. Marines were exposed to either a 6 hr or a 3 hr version of SHIP. Comparisons of pretest and posttest knowledge, attitude, and behavioral intention scores revealed similar results for both versions. For both versions of the intervention, scores on STD/HIV knowledge were significantly higher after the intervention. Both the 6 hr and the 3 hr versions of SHIP also led to significant increases on scales measuring social norms and behavioral intentions. The two versions of SHIP appeared to be of comparable effectiveness for producing short-term changes in knowledge, attitudes, and behavioral intentions.

## INTRODUCTION

Behavioral interventions to encourage safe sex practices have been shown to reduce rates of unprotected sexual intercourse in a variety of populations.<sup>1-6</sup> A growing body of scientific evidence indicates that reductions in risky sexual behavior can occur as a result of well-designed interventions.<sup>7-9</sup> A meta-analysis of cognitive-behavioral HIV interventions demonstrated a significant reduction in HIV risk behaviors with small to moderate effect sizes.<sup>10</sup> Moreover, a National Institutes of Health Consensus Panel concluded that

behavioral interventions to reduce HIV/AIDS are effective and should be widely disseminated.<sup>11</sup>

An important research question that has received little attention to date is: "How long must an HIV intervention program be in order to be effective?" The behavioral interventions described in the research literature have varied widely in duration. Kelly et al.,<sup>2</sup> for example, found a 16 hr intervention to be effective for increasing condom use in a sample of gay men, and St. Lawrence, Brasfield, Jefferson, and

O'Bannon<sup>6</sup> found a 14-hr intervention to be effective for increasing condom use among African- American adolescents. At the other extreme, some very brief HIV behavioral interventions have also been shown to be effective. Belcher et al.,<sup>12</sup> for example, found a single-session, 2-hr intervention to be effective for increasing condom use among adult women. Similarly, Valdiserri and colleagues<sup>13</sup> found a single-session, 140-minute program to be effective for increasing condom use among homosexual and bisexual men. In addition, a recent meta-analysis of HIV behavioral interventions for adolescents noted that the number of intervention hours in the studies ranged from 0.3 hr to 35 hr, with a median of 4.5 hr.<sup>8</sup>

Intuitively, it would appear that longer HIV interventions would be more effective than shorter programs. The literature on HIV interventions provides some support for this idea, but there has been a lack of systematic research in which interventions of similar content but varying duration were compared. A meta-analysis of 12 HIV risk-reduction intervention studies that included behavioral outcomes as criteria found that intervention duration was not significantly related to intervention effectiveness.<sup>10</sup> However, the authors found a trend toward greater effectiveness for longer interventions. A review of 40 HIV interventions designed specifically for adolescent populations<sup>14</sup> found that intervention duration was significantly correlated with effectiveness for only one of the six outcomes examined (number of sex partners). A recent meta-analysis of HIV interventions for adolescents<sup>8</sup> found no significant relationship between number of intervention hours and effect size, nor did they find a significant relationship between number of intervention sessions and effect size. A review of HIV interventions for women<sup>15</sup> concluded that interventions that used multiple sessions rather than a single session were more likely to be effective for increasing condom use, but duration, per se, was not examined.

A number of studies have compared HIV interventions of the same duration with varying content,<sup>12,16,17</sup> and several studies have compared HIV interventions that varied in both duration and content.<sup>6,13,18</sup> However, we were only able to find one study in which interventions of different durations but very similar content were systematically compared.<sup>4</sup> The effectiveness of a 3-session 9-hr HIV prevention intervention was compared with that of a 1-session 3 hr intervention. Both conditions were found to be effective, but behavior change was more pronounced in the 3-session condition.<sup>4</sup>

Brief interventions for health promotion goals other than HIV prevention have become increasingly popular in recent years. For example, there is evidence demonstrating the effectiveness of brief interventions for problem drinking, smoking, and substance use.<sup>19-22</sup> Evidence of the effectiveness of brief behavioral interventions to prevent STDs/HIV would have substantial tangible benefits because brief interventions would be less expensive and more feasible due to fewer logistical constraints.

Very little is known about the comparative effectiveness of HIV prevention interventions that differ in duration but contain similar content. The objective of this study was to evaluate and compare the effectiveness of two versions (6 hr vs. 3 hr) of a behavioral intervention that were similar in content but differed in duration. Because a greater "dose" of an intervention would be expected to have a greater impact on participants, it was hypothesized that a greater number of positive effects would be found for the 6 hr versus the 3 hr intervention.

## METHOD

### Overview

Marines attending the Marine Security Guard (MSG) school in Quantico, Virginia, were exposed to either a 6 hr or a 3 hr version of the STD/HIV Intervention Program (SHIP), a cognitive-behavioral intervention to prevent sexually transmitted

diseases (STDs) and HIV among Marines. The 6 hr SHIP curriculum was given to MSGs who attended the MSG school between February 1998 and February 1999; the 3 hr SHIP curriculum was given to MSGs who attended the school between March 1999 and February 2000. A pretest-posttest design was used to evaluate the effectiveness of the two versions of the intervention.

### **Description of SHIP**

SHIP was originally developed in an earlier project as an 8-hr intervention for fleet Marines.<sup>23</sup> The two shorter versions of SHIP that were developed for the MSG school were modifications of the original 8-hr course. The content and format of all versions of SHIP were based on the Information-Motivation-Behavioral Skills model,<sup>24,25</sup> a cognitive behavior model designed specifically to explain HIV risk-reduction behavior. Both versions of SHIP were designed to (1) expand the Marines' knowledge of STDs/HIV, (2) increase their motivation to engage in safe sexual behaviors, and (3) provide them with appropriate behavioral skills.

SHIP used a variety of media (e.g., videos, slides) to present information and included lectures, small group discussions, and other interactive group activities. Specifically, slide-and-lecture presentations, games, group discussions, videos, and a condom demonstration were used to present the following content areas: (1) the epidemiology of STDs and HIV/AIDS in adults; (2) the transmission and prevention of STDs/HIV; (3) the signs, symptoms, and outcomes of common STDs; (4) the clinical course of HIV/AIDS; (5) sexual decision-making; (6) alcohol use and abuse; (7) the impact of alcohol on unsafe sex and risk-taking; (8) correct condom use; and (9) values and opinions related to STDs/HIV risk behaviors. Alcohol impairment goggles were used to demonstrate the effects of a simulated 0.20 blood alcohol level on condom use.

The 3 hr version of SHIP was created from the 6 hr version through the following

changes: (1) two of the three videos that were part of the 6 hr version of SHIP ("HIV Legacy" and "Liberty Brief") were omitted (a third video called "Condom-Eze" was retained); (2) three of the longer small-group exercises were omitted; and (3) all of the slide/lecture modules included in the 6 hr version were condensed.

A Navy corpsman and a civilian instructor who were experienced in delivering HIV prevention training jointly gave the SHIP training in both versions of SHIP. The 6 hr version of SHIP was delivered in three 2-hr sessions on consecutive days in a large classroom setting. The 3 hr version of SHIP was delivered in two 1.5-hr sessions on consecutive days. There were no other differences between the 6- and 3 hr versions of SHIP.

### **Subjects**

Participants were students at the MSG school in Quantico, Virginia, whose mission is to train and screen Marines for MSG duty in foreign countries. MSGs are Marines assigned to guard and protect U.S. embassies located all over the world, including Third World countries. All prospective MSGs must graduate from the MSG school before being assigned to a U.S. embassy in a foreign country. The MSG school graduates five classes per year, with an average of about 95 graduates (range 70-130) per class. A total of 1,044 Marines were exposed to either the 6 hr or 3 hr version of SHIP. The 6 hr SHIP curriculum was given to MSGs who attended the MSG school between February 1998 and February 1999; the 3 hr SHIP curriculum was given to MSGs who attended the school between March 1999 and February 2000.

### **Measures**

The questionnaires administered to the MSGs before and after the intervention (pretests and posttests) consisted of a measure of STD/HIV knowledge, 9 psychosocial scales, and a set of demographic questions. The STD/HIV knowledge measure was composed of 21

true-false questions and 3 short-answer items and was developed specifically for this study. Scores for STD/HIV knowledge were obtained by summing the total number of correct responses, which yielded possible scores ranging from zero to 29. Higher scores indicate a higher level of knowledge. Coefficient alpha for the scale was .62, which is sufficient for a knowledge scale. (Internal consistency reliability estimates are generally low on knowledge scales because knowledge is a heterogeneous construct.)

The 9 psychosocial scales included in the pretests and posttests were as follows: (1) Social Norms I,<sup>26</sup> (2) Social Norms II,<sup>23</sup> (3) Attitudes Toward Condoms,<sup>27</sup> (4) Self-Efficacy/Impulse Control,<sup>26</sup> (5) Condom Assertiveness,<sup>28</sup> (6) Self-Efficacy for Communicating With a New Sexual Partner,<sup>29</sup> (7) AIDS Preventive Behavior,<sup>30</sup> (8) Behavioral Intentions, modeled after the Intentions to Use Condoms scale by Sanderson and Jemmott,<sup>31</sup> and (9) Perceived Susceptibility to STDs/HIV.<sup>23</sup> Coefficient alphas for the scales ranged in magnitude from .64 to .86.

### Procedure

The evaluation of both versions of SHIP used a pretest-posttest design. The pretest and posttest questionnaires were identical; each was made up of the scales previously described in the Measures section. Pretests and posttests were administered to MSGs in a classroom setting at the school. Pretests were administered approximately 2 weeks prior to the SHIP course, and posttests were administered approximately 1 week after course completion. To preserve participants' anonymity, identifiers such as names or social security numbers were not used on the questionnaires. Instead, participants were given instructions on how to create self-generated identification numbers; these were then used to match the pretest and posttests for each individual. This method has been used successfully in a number of other STD/HIV investigations.<sup>32</sup>

### Analyses

The analyses presented in this paper are based only on the MSGs who (1) had linking pretest and posttest questionnaires, and (2) who reported a marital status of "Single" or "Divorced/Widowed." Married subjects were not included in the analysis. One hundred and eighty-eight subjects were dropped either because they were discharged from the school prior to the administration of the posttests or because we were not able to link their pretests and posttests. An additional 54 subjects were dropped either because they were married or did not indicate their marital status. This resulted in a total final sample of 802 subjects—400 for the 6 hr SHIP condition and 402 for the 3 hr condition. For some analyses, sample sizes are smaller due to missing data.

Chi square and *t* tests were performed to determine if the participants in the 6 hr and 3 hr SHIP conditions differed on any of the demographic variables. Paired *t* tests were performed comparing the participants' pretest and posttest scores on the STD/HIV knowledge test and the 9 psychosocial measures; separate *t* tests were performed for the two intervention samples (6 hr and 3 hr SHIP conditions). To determine the relative effectiveness of the two intervention versions, analysis of covariance (ANCOVAs) were performed on the posttest scores for each measure, with pretest scores as the covariate and version as the between-subjects factor.

## RESULTS

### Demographic Characteristics of the Sample

Demographic information about the participants is shown in Table I. A total of 802 Marines who completed the pretests and posttests were included in the analyses. The overall sample was predominantly male (94%). The majority of participants reported White/Caucasian race/ethnicity (67%). Most of the participants (58%) had high school or equivalent education, and 39% had also attended college. Age ranged from 18 to 33 years, with a mean of 21.80 years. Tenure in the Marines ranged from .83 to 13.50 years (mean of 2.86 years).

Statistical comparisons (chi-square tests and  $t$  tests) were conducted to determine if there were any demographic differences between the two intervention groups (see Table I). No significant differences between the groups were found ( $ps > .05$ ). The two groups were similar on age ( $M = 21.75$  vs.  $21.84$ ) and tenure (years) in the Marine Corps ( $M = 2.82$  vs.  $2.91$ ). The gender distribution of the two groups was virtually identical: males made up 94% of each group. (This distribution approximates the distribution of males and females in the MSG population as a whole, P. C. Johnson, personal communication, December 21, 1999.) There was a nonsignificant difference ( $p = .10$ ) in the race/ethnic group distribution of the two groups: the 6 hr intervention group had a larger proportion of White/Caucasian participants (70%) than the 3 hr group (64%).

### Effects of the 6 hr Intervention

The results of the paired  $t$  tests comparing the 6 hr SHIP participants' pretest and posttest are shown in Table II. Consistent with our hypothesis, scores on the STD/HIV knowledge measure were significantly higher after the intervention than before,  $t(393) = -20.78, p < .01$ .

For the 6 hr intervention, significant differences between pretest and posttest means were found on 4 of the psychosocial scales: Social Norms II, Attitudes Toward Condoms, Self-Efficacy/Impulse Control, and Behavioral Intentions. On Social Norms II, the difference was in the expected direction: subjects perceived greater social norms supporting condom use after the intervention than they had before,  $t(391) = -4.61, p < .01$ . On Behavioral Intentions, the difference was also as expected: participants expressed stronger intentions to practice safe sex after the intervention,  $t(386) = -7.02, p < .01$ . On Attitudes Toward Condoms and Self-Efficacy/Impulse Control, the differences were in the direction opposite of that hypothesized. On Attitudes Toward Condoms, MSGs actually expressed a less positive attitude toward condoms after the intervention,  $t(388) = 2.61, p < .01$ .

Similarly, results for the Self-Efficacy/Impulse Control scale showed that MSGs felt less confident about being able to use condoms in difficult situations (e.g., when under the influence of alcohol) after the intervention,  $t(368) = 2.85, p < .01$ .

### Effects of the 3 hr Intervention

The results of paired  $t$  tests comparing the 3 hr intervention participants' pretest and posttest means are shown in Table II. Similar to the 6 hr intervention, scores on the STD/HIV knowledge measure were significantly higher after the 3 hr intervention than before,  $t(400) = -20.19, p < .01$ .

For the 3 hr intervention participants, significant differences between pretest and posttest means were found on Social Norms II, Condom Assertiveness, Self-Efficacy for Communicating With a New Sexual Partner, Behavioral Intentions, and Perceived Susceptibility to STDs/HIV. On Social Norms II, Behavioral Intentions, and Perceived Susceptibility to STDs/HIV, the differences were in the expected direction. Participants perceived greater social norms supporting condom use,  $t(394) = -4.60, p < .01$ , had stronger behavioral intentions to have safe sex,  $t(389) = -5.06, p < .01$ , and felt more susceptible to STDs/HIV,  $t(389) = -2.14, p = .03$ , after the intervention.

On Condom Assertiveness and Self-Efficacy for Communicating With a New Sexual Partner, the differences were significant but in the direction opposite of that hypothesized. On Condom Assertiveness, MSGs felt less assertive about suggesting condom use with a partner after the intervention,  $t(396) = 3.38, p < .01$ . The results on Self-Efficacy for Communicating With a New Sexual Partner indicated that MSGs had lower self-efficacy for communicating with a new partner after the intervention,  $t(396) = 3.96, p < .01$ .

### Comparison of 3- and 6 hr Interventions

To determine if intervention version had an impact on the participants' posttest scores, ANCOVAs were performed on posttest scores for each measure, with

pretest scores as the covariate. These analyses revealed significant differences due to version for 2 of the 9 psychosocial scales: Attitudes Toward Condoms and Behavioral Intentions. Participants in the 6 hr condition showed a significant deterioration in Attitudes Toward Condoms, whereas the attitudes of participants in the 3 hr condition remained unchanged,  $F(1,781) = 5.69, p < .05$ . However, participants in the 6 hr condition showed more improvement in Behavioral Intentions than those in the 3 hr condition,  $F(1,776) = 4.69, p < .05$ .

The analyses comparing the interventions are summarized in Table III. Both the 3 hr and the 6 hr versions of SHIP appeared to produce a significant increase in STD/HIV Knowledge, Social Norms II, and Behavioral Intentions. Four positive and two negative effects were found for the 3 hr intervention and three positive and two negative effects were found for the 6 hr intervention. Given the large number of statistical tests performed, relatively few differences due to intervention version were observed.

## DISCUSSION

The purpose of this study was to evaluate and compare the effectiveness of a 6 hr and a 3 hr version of a behavioral intervention to prevent STDs/HIV. The results of this study revealed very few differences between the 6 hr and 3 hr versions of the intervention. Both versions were effective in increasing participants' knowledge of STDs and HIV, and both led to significant increases on scales measuring social norms and behavioral intentions. Viewed globally, both versions of the intervention produced about the same number of positive effects on the psychosocial scales.

In addition to producing some positive effects, both versions of SHIP were associated with effects that were contrary to expectation. The 3 hr intervention produced counterintuitive effects on condom assertiveness and self-efficacy for communicating with a new sexual partner. Similarly, the 6 hr intervention produced

counterintuitive effects on attitudes toward condoms and self-efficacy/impulse control.

It is surprising that the 6 hr version of SHIP was not significantly more effective in changing knowledge and attitudes than the 3 hr version. It is possible that because the 3 hr version ran at a faster pace than the 6 hr version, and the material was presented in a very condensed style, it may have actually been more effective in capturing and holding the Marines' interest. (This was the impression of one of the two instructors who gave the training.) Another major difference between the two versions of SHIP was that in the 3 hr version, three of the more lengthy small-group exercises were dropped. It may be that these time-consuming activities did not contribute much "added value" to the 6 hr program. The other major difference between the versions was that the 3 hr version omitted the two longer videos that were part of the 6 hr SHIP ("HIV Legacy" and "Liberty Brief"). Although the course evaluation data indicated that the Marines enjoyed watching these videos, it may be that they did not have a substantial impact on their knowledge, attitudes, and behavioral intentions.

A number of limitations of this study should be noted. One limitation was the lack of random assignment of subjects to intervention conditions. After the first year of SHIP's implementation, the MSG school staff changed the amount of time allotted for SHIP in the school schedule. Consequently, the MSGs who attended the school during Year 1 received the 6 hr version of SHIP, and those attending the school during Year 2 received the 3 hr version. Although a demographic comparison of the two groups did not reveal any major differences, differences between the two groups could have existed on variables that were not measured. Another limitation of the study is the large number of participants who participated in SHIP but who were lost from the sample of pretests and posttests due to attrition from the school or our inability to link their pretests and posttests. Consequently, the present sample may not be representative of the MSG population.

An additional limitation of this study was the fact that we did not examine the impact of the intervention on behavioral outcomes such as condom use or on disease rates.

Despite these limitations, this study makes a contribution to the literature on HIV prevention interventions. This is one of the only studies to date that has compared the effectiveness of behavioral interventions that vary in duration but are similar in content. This is also one of very few studies<sup>23,33</sup> that have examined the effectiveness of an STD/HIV intervention in a U.S. military population.

Clearly, more research is needed on the effectiveness of behavioral interventions that differ in duration. Evidence of the effectiveness of brief behavioral interventions to prevent STDs/HIV would be of great practical benefit to the U.S.

military. Just as brief or “minimal” interventions have been developed for smoking, problem drinking, and substance use,<sup>19-21</sup> it may be possible to develop short, cost-effective behavioral interventions to encourage safer sexual behavior. If brief STD/HIV interventions can be designed that approach the effectiveness of more time-consuming programs, this would allow resources to be allocated more efficiently and to a larger number of people. It is also possible that more individuals would be willing to participate in brief, as opposed to more time-intensive, interventions. More research is needed to determine whether brief HIV prevention interventions can be effective and to determine if, and under what circumstances, intervention duration makes a difference in program effectiveness.

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**Table I**  
**DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLES**

	<b>Total (N = 802)</b>	<b>3 hr (N = 402)</b>	<b>6 hr (N = 400)</b>	<b><i>p</i> Value</b>
Gender (%) <sup>a</sup>				<i>p</i> > .10
Male	94	94	94	
Female	6	6	6	
Race/ethnic status (%) <sup>a</sup>				<i>p</i> = .10
White/Caucasian	67	64	70	
Black	10	10	10	
Hispanic	17	20	14	
Asian/Pacific Islander	3	3	3	
Other	3	3	3	
Education level (%) <sup>a</sup>				<i>p</i> > .10
High school graduate	58	59	58	
Some college (no degree)	39	39	38	
College degree (2- or 4-yr)	3	2	4	
Age (mean years) <sup>b</sup>	21.80	21.75	21.84	<i>p</i> > .10
Tenure in the Marines <sup>b</sup> (mean years)	2.86	2.82	2.91	<i>p</i> > .10

<sup>a</sup>Chi-square test was performed.

<sup>b</sup>*t* test was performed.

**TABLE II**  
**PAIRED *t* TESTS COMPARING PRETEST AND POSTTEST MEASURES**

Scale	6 hr Intervention				3 hr Intervention			
	Pretest Mean	Posttest Mean	<i>t</i>	<i>p</i>	Pretest Mean	Posttest Mean	<i>t</i>	<i>p</i>
STD/HIV Knowledge	22.71	25.10	-20.78	< .01	22.43	25.04	-22.19	< .01
Social Norms I	9.92	10.05	-1.15	<i>ns</i>	9.90	9.96	-0.57	<i>ns</i>
Social Norms II	13.08	13.69	-4.61	< .01	12.67	13.28	-4.60	< .01
Attitudes Toward Condoms	25.32	24.77	2.61	< .01	24.70	24.92	-1.24	<i>ns</i>
Self-Efficacy/Impulse Control	21.19	20.78	2.85	< .01	21.00	20.86	0.97	<i>ns</i>
Condom Assertiveness	13.27	13.17	1.16	<i>ns</i>	13.28	12.97	3.38	< .01
Self-Efficacy for Communicating With a New Sexual Partner	14.95	14.88	0.43	<i>ns</i>	15.33	14.76	3.96	< .01
AIDS Preventive Behavior	14.44	14.39	0.78	<i>ns</i>	14.36	14.39	-0.45	<i>ns</i>
Behavioral Intentions	17.34	18.08	-7.02	< .01	16.87	17.54	-5.06	< .01
Perceived Susceptibility to STDs/HIV	3.30	3.40	-1.74	.08	3.48	3.63	-2.14	.03

*Note.* *ns* = nonsignificant,  $p > .10$ .

**TABLE III**  
**OVERALL COMPARISON OF 3- AND 6 HR INTERVENTIONS**

<b>Scale</b>	<b>3 hr Intervention</b>	<b>6 hr Intervention</b>	<b>Statistical Difference by Version?</b>
STD/HIV Knowledge	+	+	No
Social Norms I	0	0	No
Social Norms II	+	+	No
Attitudes Toward Condoms	0	–	Yes
Self-Efficacy/Impulse Control	0	–	No
Condom Assertiveness	–	0	No
Self-Efficacy for Communi- ting With a New Sexual Partner	–	0	No
AIDS Preventive Behavior	0	0	No
Behavioral Intentions	+	+	Yes
Perceived Susceptibility to STDs/HIV	+	0	No

+ = Significant positive effect.

– = Significant negative effect.

0 = No significant effect.

## REPORT DOCUMENTATION PAGE

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**14. ABSTRACT (maximum 200 words)**

Little is known about the comparative effectiveness of HIV prevention interventions that differ in duration but contain similar content. The objective of this study was to evaluate and compare the effectiveness of two versions (6 hr vs. 3 hr) of a behavioral intervention called the STD/HIV Intervention Program (SHIP) in a sample of Marines. Marines were exposed to either a 6 hr or a 3 hr version of SHIP. Comparisons of pretest and posttest knowledge, attitude, and behavioral intention scores revealed similar results for both versions. For both versions of the intervention, scores on STD/HIV knowledge were significantly higher after the intervention. Both the 6 hr and the 3 hr versions of SHIP also led to significant increases on scales measuring social norms and behavioral intentions. The two versions of SHIP appeared to be of comparable effectiveness for producing short-term changes in knowledge, attitudes, and behavioral intentions.

**15. SUBJECT TERMS**

HIV prevention, behavioral interventions, Marines, sexually transmitted diseases

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